

*QUANTUM-PRO: A SYSTEMIC APPROACH TO ACHIEVING EXCELLENCE*

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This paper will explore the successful application of a systemic approach to measurably improve effective team management in health care. While the system identified in this paper has enjoyed a high degree of success in aviation, it is now accepted by forward-thinking health care teams with little adaptation. This team management system utilizes basic, readily transferred skills and procedures for communication, team building, decision making and problem resolution principles in the form of standardized procedures which empower all team members and strengthen team leadership.

## Introduction

“Don’t try to change my personality or my attitudes, just tell me what I need to do.” The basic philosophy that drives the *Quantum-Pro* Management System is that we cannot, nor do we want to, change an individual’s attitudes, at least not directly. We can, however, change his behavior. We can teach skills and procedures. These can be fairly easily taught, monitored, evaluated and enforced in a fair and consistent manner throughout an organization.

Attitudes do change, but as a result of the behavioral change. The successes that result from the new behaviors will ultimately modify the individual’s attitudes, which further reinforce compliance with the new skills and procedures, producing more successes and more supportive attitudes, a self-reinforcing cycle of continuous improvement.

## Background

The *Quantum-Pro* Management System has its roots in aviation, with the initial task analysis commencing in 1979 and the first commercial product available two years later in 1981. The task analysis generated 167 specific behavioral objectives; 131 specific informational objectives; and 71 specific attitudinal objectives. These were then organized into a more manageable form – nine Standard Management Procedures, three Communication Rules and four Professional Responsibilities – the basic structural elements of *Quantum-Pro*.

Our aviation pedigree predisposed us to a strong procedural orientation. In fact, we view our Standard Management Procedures (SMPs) as Standard Operating Procedures for team management.

## Some Basics First

## Safety

We all talk about safety. Most people in aviation will adamantly assert that they *never* trade off flight safety. That sounds good, and most likely is comforting to the general public. But is it realistic? It is practical? Is it true? Not by our definition. We define safety as *freedom from risk*. All activities have

some inherent degree of risk. Our job, as professionals, is to identify and manage that risk within acceptable limits. Most industries define these minimum standards through industry and governmental regulations. Organizations and teams can place more stringent limits based upon their own particular situation, but they can never exceed those established by regulation. In aviation, every time we put a piece of luggage or a passenger on the airplane, we’re reducing the aircraft’s performance; every time we fly in less than absolutely perfect weather conditions, we assume a greater risk; many of the flight maneuvers required by local regulations to reduce noise levels around airports adversely affect flight safety. Does that mean we don’t fly? No, of course not, that would be totally impractical. Rather, we manage these risks. Government and industry defines minimum standards that assure a reasonable level of safety. Many organizations and individuals establish more conservative limits. Like it or not, we’re all risk managers.

## Team

Team is another term that we need to define. We consider a team as one or more individuals working towards a common goal. In aviation, this goal may be safe, reliable, on-time, efficient air transportation, or perhaps more specifically, safe reliable on-time, efficient air transportation for *these passengers from point A to point B*. In health care, it may be something as general as providing cost effective health care to the greater St. Louis community. Or it might be more specific: to diagnose and treat Mrs. Smith’s abdominal pain; or successfully perform a triple bypass on Mr. Jones (and of course “success” must be clearly defined).

## Five Ps

A basic prerequisite for any effective team, is what we call the Five Ps – Purpose, Philosophy, Policies, Procedures and Practice. Without going into much detail here, the key is to view these Five Ps from the perspective of the organization, the team, and the individual. They must all be in alignment (i.e. no conflicts).

As an example, one healthcare organization’s purpose states: “Our mission ... is caring for our

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patients. To this end, we organize people, equipment and facilities in a manner that best responds to their needs and to the needs of their families. Our priorities are: patients and families; physicians; employees.

“Our Vision is to be a nationally recognized leader in patient satisfaction ... Our Vision of exceeding customer expectations has focused our organization and our employees on achieving excellence in quality and service. Throughout our organization, our employees strive to provide sensitive, quality health care at all times by living our values of S.T.E.P. – Service, Teamwork, Excellence, and Professionalism.”

The mission, vision, or purpose (the specific nomenclature is not important here) of the organization, team and individual will be somewhat different, but they must support one another. Consistent use of the Five Ps is the first step of the decision-making process, and enables teams (and individuals) to make the right decision, or the best possible decision.

If you don't practice (the fifth P) what you preach (the first four Ps) then it is all a wasted effort. If you fail to do what you say and commit to, then you lose credibility in the eyes of others as well as yourself. In a sense, this should be the easiest of the Five Ps, and it is, if the first four Ps are true to the organization or individual.

### Error Tolerance and the Three Truths

There are three basic truths that apply to all high-consequence industries and are essential to the design of the *Quantum-Pro* Management System.

1. This is a potentially hazardous environment
2. The laws of nature are infallible
3. Humans are fallible

We work in a potentially hazardous environment. If something or someone fails, people could get hurt. It might be a single patient, a rescue team, a powerplant, a loaded airliner (or two), a community or more.

We must work within the laws of nature. There are some things we simply cannot change. For instance, an airfoil (wing, propeller, rotary wing, turbine, etc.) will stall at a given angle of attack, and there is nothing we can do to change it. However, we can change the shape of a wing's airfoil through the use of flaps and leading edge slats, thereby changing the stall characteristics of the wing (by creating a new airfoil).

And finally, yes, we all make mistakes. Some of us make them more frequently than others, but we all make errors.

Therefore, it is essential to have a management system in place that is error tolerant. An error tolerant system has two primary roles. One is proactive, reducing the possibility of errors being committed. The other is reactive, quickly recognizing and managing any errors that are made, mitigating adverse affects.

### A Management System

We say *Quantum-Pro* is a complete system. What do we mean by that? While all of the management elements can be used independently, they are designed as components of a comprehensive system. Think of any mechanical system, a car, for instance. While each of the components may work alone, the true value is when they are used as part of the entire system. The car's engine, brakes, steering, etc. all may function when viewed independently, but it's the complete system, the car, that it is of real use.

Just as important, the parts aren't universally interchangeable. We can't for instance, swap a Volkswagen Beetle engine with a Hummer engine and expect the Hummer to get the performance and gas mileage of the Beetle, nor can we expect the Beetle to perform like a Hummer with it's new engine. System design goes back to the Five Ps. Obviously, the purposes and philosophies of each vehicle are quite different. That dictates the vehicle's design.

Continuing this analogy of a mechanical system, most well-designed systems (error tolerant systems) considered to be critical have five characteristics in common.

1. The design guides users to proper use of the system
2. The system quickly identifies and corrects any errors
3. The system provides for a means of monitoring the system's performance
4. The system provides a source of redundancy or backup for critical components.
5. The system incorporates a feedback loop to improve future performance.

While we really don't see many critical systems in civilian automotive design, we see numerous examples in aviation. Consider any critical aircraft system, hydraulic, electrical, control, navigation, etc. Guidance is provided through training, procedures, checklists, and ergonomics (e.g., the controls are positioned and designed for proper operation). Error identification and correction comes in the form of warnings (synthesized speech, bells, horns, lights, "stick shakers", etc.) Error correction comes in the form of abnormal and emergency procedures. The systems are easily monitored by instrumentation, sounds and lights. Critical systems have built-in

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redundancy, sometimes multiple redundancy, depending upon the consequence of system failure.

### Process v. Event-Driven

Error trapping and mitigation requires constant vigilance. This means that the system used to identify and correct errors in their infancy (when they are more easily managed, and the teams have more options at their disposal) must be continuously assessing the situation.

Process-driven management is proactive. The team actively searches for potential problems and develops strategies for managing them (identification and mitigation) should they occur.

Anytime new information is presented to the team, it is automatically evaluated. Does this new information support our current concept of the situation or does it conflict with it? If the new data is consistent with the team's understanding of the situation, then all is well for the moment. If this new piece of information does not fit, the team is presented with its first cue that their current concept may not be completely accurate. They do not have to option to rationalize.

Event-driven management, on the other hand, is reactive, assuming all is well until someone recognizes that there may be a problem. The team then determines which tool might best be used for this particular problem. This off/on approach is ineffective, and is generally activated much later than one that is continuously active.

### Briefings

So what's so special about briefings? They are boring, awkward, time-consuming and, well, basically nothing more than a waste of everyone's valuable time, right? Absolutely, the way many teams brief. If it's not done right, it is a waste of time, and does little more than frustrate everyone.

A good briefing, however, can be just the opposite. It can save a tremendous amount of time and head off potential errors. First of all, an effective briefing is not a speech by the team leader, telling everyone his or her plan, followed by a quick "Any questions? No? Okay, let's get to work." Instead, the team, all of whom are professionals or interested parties who are prepared to discuss the flight, shift, or procedure, discuss pertinent elements of the upcoming event. It is important to include all team members in this process. In healthcare, this may include physicians, nurses, social workers, patients, and family members. While the team leader may assume the leadership role in this, he or she may spend more time listening than speaking.

The team looks at the event from all disciplines. The first task is to briefly agree upon the purpose or

mission of the team. What do they want to accomplish? Given this agreement, the team establishes operational rules (use of *Quantum-Pro*, SOPs, etc), individual roles and responsibilities, and identify specific strengths and weaknesses. Are there any strengths that will help the team? In aviation, this could be special expertise, weather, passenger load, traffic, fuel load, aircraft performance. In healthcare, it could include available equipment, expertise or experience of team members, the patient's physical, mental, emotional condition. Having identified these strengths, how might the team best use these strengths to its advantage in accomplishing its stated goals?

How about any potential weaknesses? Now is the time to identify and develop plans to manage any possible problems or weaknesses that might affect the flight or procedure. We might look to the same sort of things that we just considered as possible strengths – team composition, equipment, environmental considerations, (in aviation, aircraft performance, weather, traffic, load factors; in healthcare, patient's age, health, attitude, family support, etc). Ask the question, "What could go wrong?" Once all these potential weaknesses are identified, how will the team manage these? How will the team monitor the situation so that a turn for the worse will be quickly recognized? What alternative plans are necessary? Who will do what? Establish monitoring guidelines, Bottom Lines, Back Doors. Assess all risks.

### Debriefings

The debrief is another procedure that many people love to hate. Done poorly, it can be a torturous ordeal and can be ineffective at best, or do a great deal of damage, at worst. As one pilot shared with us when we mentioned the briefing, "Briefings? Oh sure, that's then I hear about all the mistakes I made." Unfortunately, this is not all that an unusual experience. Is it any wonder people hate to debrief?

An effective debrief is an investment in the future. There is nothing we can do to change the past, but there is a lot we can do to impact future performance. That is our goal here. It is a learning process.

Just like the briefing, a debriefing should be an interactive process –a discussion among professionals. In fact, the untrained observer may not even recognize either of these events as a briefing or debriefing.

The debriefing is focused and should explore both positive and negative events. There is a tremendous amount we can learn from properly debriefing something that went well. It is important to identify specifically what the team did to affect this favorable outcome, and then reinforce these behaviors to replicate the successes. By the same token, the team needs to identify those things that did not go so well,

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and find the root cause(s) so that corrective action can be taken to assure continued improvement over time.

One of the most difficult debrief skills for many people is identifying the root cause. They all too often identify operational symptoms and stop there. Chasing symptoms down is very inefficient. However, if the analysis is continued far enough, the team will uncover the underlying reasons for the success or failure. In most cases, this will take the team back to use or mis-use of the management system.

### The Concept Alignment Process

One of the management system's fundamental SMPs is the Concept Alignment Process. The purpose of this procedure is twofold: to ensure that everyone on the team shares the same concept of the situation; and that this common concept is complete and accurate, or as close to complete and accurate as possible, given the information available to the team at the time.

The Concept Alignment Process in its most basic form has four steps.

1. Statement of Concept. While anyone can make an initial statement of concept, it is usually the team leader. He/she states the current situation as specifically and completely as practical. This includes any pertinent parameters, limits, conditions, assumptions, as well as roles and responsibilities and expected outcome(s).

Briefings are a form of statements of concept.

2. Affirm/Challenge. It is the responsibility of the team member(s) to either confirm that the statement of concept is correct and complete, or that there may be another possible concept.

If the team affirms the statement, they progress to the judgment step as a final check that the team is not overlooking anything, or that strong personalities have not unintentionally lead others down the Poor Judgment Chain (or Error Chain).

If an alternate concept is raised, the team moves to the validation step.

3. Validation. The team considers the various concepts. Whenever possible, they validate by going back to an appropriate third source of information. (performance or procedure manuals, rechecking measurements, consulting with the patient or passengers, etc.)

Going along with the team leader or other strong personality because he/she is confident and forceful, and time is short, is not acceptable. Doing the wrong thing quickly, efficiently, and confidently is rarely the best route. This also undermines the rest of the team and the monitor and backup functions are quickly lost as the team breaks down.

What if none of the concepts can be validated? Or two or more can be validated? If safety is not an issue – the team could select either operating concept and the outcome would be essentially the same – the team leader selects the concept to be taken to the judgment step.

If one concept cannot be validated to the exclusion of the others and safety is an issue, the team must protect against the condition or situation that represents the greatest danger or risk. For instance if the captain thinks the airplane is on the proper approach path, and the first officer thinks the airplane is too low, and neither concept can be clearly validated, the crew adopts the concept that they are too low as this represents the greatest risk. The approach is broken off, and with the safety of the aircraft assured, the crew sorts the problem out. Was it a visual illusion, instrumentation problem (human or mechanical failure), or what?

4. Judgment. Once the team has selected a concept or course of action, they move to the judgment step. This is an opportunity to take a step back and assess the risks before committing the team to the proposed action or decision. Everything we do has some element of risk, our job is to identify and manage it.

If the risks are unacceptable or cannot be managed, the team goes back to reassess the situation and build another plan.

This is an automatic process. The team follows the procedure without undue discussion or wasted time or effort. Personalities are factored out of the equation; team decisions and actions are based on factual data.

### A Management System in Action

Consistent use of *Quantum-Pro* provides a structured approach to system-wide process improvement. At times, the improvement comes from unexpected sources. The following case studies are taken from

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flight and maintenance crews at various points in their *Quantum-Pro* training program.

### Case 1: Overcorrection on Approach

This case illustrates the importance of making the management system routine practice. Process-driven management is active at all times, even when the team is not aware of an event that requires the use of “specialized CRM or MRM tools”.

Following a successful flight, with no significant events either positive or negative, the crew decided to debrief a minor corrective turn on their approach. The airport was one with which they were quite familiar, with regular flights into this airport nestled in the mountains. Prior to *Quantum-Pro* they never would have given this a second thought, as everything went quite smoothly. However, company policy required them to select an event to debrief – one that went particularly well, or one that they could have done better, the choice is entirely up to the crew. They decided to discuss the turn on final, not really expecting it to lead anywhere. It was really a “non-event”. The pilot not flying (the pilot monitoring) started off, saying he could have helped call the turn had he been monitoring the maneuver better, but he was busy with a checklist required at that point in the flight. This lead the team to question why he was busy with the checklist when things are normally quite busy. It’s best to have both pilots’ attention on the approach itself (checking traffic, terrain, flight path, etc). This in turn, lead the crew to an analysis of the checklists required during descent and approach. After some independent research, the crew presented their recommendations for modifying the airplane’s approach and landing checklists, to the company management team. These recommendations were accepted, the checklists revised, significantly reducing the workload for *all* crews flying this aircraft, regardless of the destination airport. This became particularly evident on the next simulator flight in which the simulator operator was unable to overload the company crews on approach.

Not every debrief results in such significant improvements, but it is quite likely that some benefits, great or small, can be derived from a proper debrief. In this case, the crew used the structured debrief of a minor operational issue and addressed the root cause for lasting system-wide benefits to the company.

Most, if not all, successes and failures are a product of the entire team. Yes, each individual has responsibilities, and must be held accountable, but as team members, they have team responsibilities. In the example above, while the pilot flying was the sole manipulator of the controls, the overshoot was a team failure. Where was the monitor and backup?

Every debrief concludes with an action statement. What, specifically, will the team do to ensure they

continue to do those things they did well, and to correct or improve where performance was lacking? We’re not looking for an “I’ll never do that again” or “I’ll try harder next time”. It must be something specific as the crew in the prior example did. They decided the appropriate course of action was to review the workload upon descent and approach. They found that some of the items they performed on short final could be moved to a lower workload period. They developed a plan to review the checklists, make recommendations for further review by the manufacturer and company management, and then final approval. They established individual responsibilities and timelines for the project.

### Case 2: Start-up Generator Assist

Two maintenance technicians, fresh out of school for the aircraft, learned that the manufacturer’s start-up procedure differed from that practiced by the company. They discussed this with the maintenance manager, who had last attended manufacturer training on this about ten years prior. He indicated that when he was trained, the accepted procedure was to perform a cross-generator start to protect the batteries from taking an extra “hit”. Investigation by one of the technicians showed that the starters were averaging 500-800 starts, verses the 1200 cycles they should have expected with the currently approved procedure. This was communicated to the chief pilot who immediately ordered all pilots to adopt the procedures endorsed by the manufacturer.

This illustrates how a team should deal with conceptual differences in accordance with the Concept Alignment Process. For some time, the pilots had been using an old start-up procedure (consistent with what the maintenance manager had been taught years ago). A new concept was created when the technicians went to the manufacturer’s school. To resolve this dichotomy, they referred to a third source, the aircraft operations manual, which confirmed the technicians’ concept, and refuted that of the pilots and the maintenance manager. This was further validated by another technician’s research that indicated they were getting about half the number of cycles they could normally have expected with the currently approved procedure. A memo from the chief pilot closed the loop, requiring all flight crews to use the “new” procedures, reducing operating expenses, and the risk of failure, which could directly impact passenger service.

### Case 3: Fuel Filter Removal

The maintenance manager had been bothered by a manufacturer’s document specifying an in-line (EPA) fuel filter be removed from each engine, without calling for any other parts to replace it. He queried the manufacturer’s technical representative, who stated there were no replacement parts or unions required at that time, but that the associated injection pump would be replaced with a newer model with a subsequently scheduled engine rebuild. Unsatisfied,

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another tech rep who had been recently trained on this, was questioned. He confirmed what the prior tech rep stated, and demonstrated that the filter was easily removed without new unions. He also stated that a modified pump, possibly with its own filter screen, would be installed with the engine rebuild.

Challenges can, and do, come from anywhere; they don't necessarily have to come from an individual. In this case, the maintenance manager's concept was challenged by the manufacturer's document. This new concept was confirmed/validated by the manufacturer's representatives. The final validation came with further research and a demonstration as to how it would actually work.

In many cases, the written manuals are the definitive third source of information used to validate concepts. In some cases, such as this, the manual or other official document needs to be validated. Experts need to be consulted and they need to provide clear validation of one of the concepts.

It is important to understand that when giving directions that appear to be contrary to common practice, additional explanation may be required to clarify the actions requested. It is reasonable to expect a conscientious professional to question new procedures. They want to know the logic behind the instructions.

### Summary

Any team management system used in high-consequence industries must take into consideration that humans *will* make mistakes, and these mistakes can be detrimental to human life, therefore, it must be an error tolerant system. An effective team management system provides a sound structure for communications and decision-making that is active throughout the organization, at all times – the skills and procedures become habitual. All team members are held responsible and accountable for the team's success/failure. Compliance cannot be optional. Everyone knows what is expected of themselves as well as all other team members. This is the hallmark of excellence for all teams – whether in aviation, medicine, energy production, public safety, even sports.

As a result, teams make the best possible decisions in a consistent, reliable, repeatable manner.